

Biyoloji Öğrencilerinin Motivasyon Tarzlarının Tespiti

A Diagnostic study of biology students' motivational styles

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ÖZET

Bu çalışmanın amacı, biyoloji öğrencilerinin motivasyon tarzlarını belirlemek ve eşey farklılıklarını ortaya koymaktır. Öğrencilerin motivasyon tarzları, başarı, meraklılık, bilinçlilik ve sosyallik bağlamında ölçen bir anket formuyla belirlenmiştir. Fen Edebiyat Fakültesi biyoloji bölümünde okuyan 164 öğrenci çalışmaya katılmıştır. Sonuçlar, tüm örnekleme meraklı ve sosyal öğrencilerin sayısının, başaran ve bilinçli öğrencilerden daha fazla olduğunu ama her düzey içinde farklılıkların ortaya çıktığını ii) erkek öğrencilerin kız öğrencilerden daha fazla başaran tipinde, fakat kız öğrencilerde erkeklere nazaran daha fazla bilinçli tipinde bulunduğunu göstermiştir. Sonuçların biyoloji öğrenimi ve öğretimi ve aynı zamanda öğretim teknikleri açısından etkisi literatürdeki bulguların ışığında tartışılmıştır.

Anahtar Kelimeler: Motivasyon tarzı, cinsiyet, başarı, merak, bilinçlilik, sosyallik

ABSTRACT

This study aimed to reveal the motivational styles of biology students and to find out the gender difference regarding motivational styles. Students' motivational styles were explored by a questionnaire whose items were written to correspond to four motivational pattern: achievement, curiosity, conscientious and sociability. A total of 164 university students who were studying biology in the faculty of science participated in this study. The results showed that i) for the whole sample, the numbers of curious and social students are fairly higher than the achiever and the conscientious students however, there are differences for each level, ii) more boys than girls appeared as achiever, on the other hand, more girls than boys appeared as conscientious. The implication of the results for teaching and learning biology as well as for instructional materials is discussed in the light of findings of other studies given in the literature.

Key Words: Motivational style, gender, achievement, curiosity, conscientious, sociability

1. INTRODUCTION

Since 1980's special attention have been given by many researchers in science education to students' cognitive characteristics and their effect on students' performance in science disciplines. *Cognitive styles* (Witkin and Goodenough; 1981; Armstrong, 2000; Bahar and Hansell, 2000), *learning styles* (Kolb, 1984; Biggs, 1987; Smith, 2002; Cano-Garcia and Hewitt, 2000) were among these cognitive characteristics. Some researchers have also focused to the motivational styles (Adar, 1969; Hofstein and Kempa, 1985; Kempa and Diaz, 1990a, 1990b; Al-Naeme, 1991; Hofstein and Walberg, 1995; Solomon, 1996).

Most people who have teaching experience can understand without difficulty how much the concept of motivation is important in teaching and learning process. They might have often complaint that students do not work hard enough at school. These students were often classified as lazy or "unmotivated". As Johnstone (1997) stated motivation is a blanket word which is seldom defined, but often used to describe what students seem to lack. Anderson and Draper (1991) also suggest that motivation is the single factor that most affects learning, though they recognise that motivation is a term much used, but not well understood.

One way to think of motivation is to distinguish between internal and external constraints on behaviour: Intrinsic motivation refers to behaviours that are engaged in for their own sake (Deci et.al., 1991). When an individual is intrinsically motivated, tasks are performed for internal reasons, like as joy and satisfaction, rather than for external reasons, such as reward, obligation, or threat of punishment. Hence a student is intrinsically motivated when he/she solves unassigned math problems because they interest her/him. On the other hand, extrinsic motivation refers to behaviours that are performed to achieve some externally prized consequence, not out of interest or a personal desire for mastery. Solving physics problems that one does not enjoy as they were assigned, as homework is one example.

There are number of theories on motivation. Even though these theories of motivation are different, in all of them two important elements can be found: need and readiness. Adar (1969), working in the field of student motivation, postulated the existence of four different motivational types of student, based on the

predominance in a student of the following 'needs': i) the need to achieve, ii) the need to satisfy one's curiosity, iii) the need to discharge a duty, and iv) the need to affiliate with other people. Adar referred to the four motivational types of students as *achiever, curious, conscientious and social*, respectively. In connection with motivational dimension, there are number of studies based on Adar's classification of motivational styles (Hofstein and Kempa, 1985; Kempa and Diaz 1990a, 1990b; Johnstone and Al-Naeme, 1995). In all of these studies motivational styles appeared as one of the important factor that effecting learning and student' performance in different instructional environment.

The gender difference in terms of motivational styles was also indicated in a couple of research studies. For example, the results of the study that was conducted 390 second-year high school students showed that for two of the motivational styles differences exist between two gender groups: the boys in the student sample examined are distinctly more achievement-oriented than are their female counterparts. However, for conscientious style, girls appear to be leaning more strongly towards this motivational pattern than do the boys. (Kempa and Diaz, 1990a). Similar results were also indicated in the study done by Trumper (1995) with 944 students aged from 14 to 17 in Israel.

Most of the studies mentioned above have been done in the field of chemistry, but there is not any study in the literature in the field of biology in terms of students' motivational characteristics. The concept of motivational style is also fairly new in our country. In this study it was aimed;

- i) to find out the motivational styles of biology students,
- ii) to reveal the gender difference regarding motivational styles and,
- iii) to present critically the preference of students who have different motivational styles about instructional materials in the light of findings of other studies given in the literature.

2. METHOD

Sample and Questionnaire about Motivational Styles

A total of 164 university students who were studying biology in the Faculty of Science, in Abant Izzet Baysal University participated in this study. Nearly all of the

students, aged from 18 to 24, studying in the department of biology from first to fourth year (74 first year including day and night groups, 26 second year, 30 third year, 34 fourth year) were given a questionnaire which was meant to assign them to their different motivational patterns. This questionnaire based on Adar's (1969) and Hofstein and Kempa's (1985) work. However, the questionnaire used by the above mentioned researchers were modified in to the form that was used in this research. This version of the questionnaire had been used in recent studies (Al Naeme 1991, Lyall and Johnstone, 1999) and the validity and reliability of the test had already been established. Because the teaching is done in English in biology department in Faculty of Science in Abant Izzet Baysal University, the motivational styles test were not translated in Turkish and it was applied in original form.

The questionnaire consisted of statements made by female and male students regarding different aspects of teaching and learning, ie. about class work, laboratory works, discovery learning and social life. In the questionnaire, the statements about different aspects of teaching and learning were presented in balloon form, with four individuals giving their opinion. Four named pupils made statements under each heading representing typical statements that would be made by pupils in a particular group of motivational pattern eg. Row 1:

- Achiever (Ian) It is very important for me to be in the top few of the class.
- Conscientious (David) I do not like to offer suggestions in class discussions unless I am sure I am right.
- Curious (Bina) In class, I enjoy hearing about the applications to everyday life whether they are examined or not.
- Social (Maria) The support of my friends is very important to me during exam time.

The students in the sample were required to choose by name in one row at the time the student agreed most with and write that name down in the space at the end of each row. To classify the students into their motivational styles following criteria is used:

If a student chooses four curious statements (ratio 4:0), or three curious statements and one of the other (ratio 3:1) or two curious, one of each eg, one achiever and one social (ratio 2:1:1) is classified as curious. However, if she/he pick two curious and two of any other such as two conscientious or two achiever (ratio 2:2) or if she

chooses four statements that all statements were different (ratio 1:1:1:1) she/he regarded as unclassifiable. This pattern emerged as above giving the ratio 2:2 or 1:1:1:1 was considered as normal, because people are thought to have a mixture of these characteristics except that they would display a bias towards one in particular.

Before starting to the test, the students were explained about how they are required to do test and each student was sit next to each other with enough space to prevent the influencing and the copying from others.

3. RESULTS AND DISCUSSIONS

Table 1 shows the distribution of the sample over the motivational pattern and the number of students in each category of motivational styles for each level.

Table 1: Distribution of the population according to motivational patterns

Motivational Style	N	Level 1	Level 2	Level 3	Level 4
Achiever	35	18	5	6	6
Conscientious	31	17	8	4	2
Curious	44	17	6	7	14
Social	40	14	6	10	10
No pattern	14	8	1	3	2
Total	164	74	26	30	34

As can be seen from Table 1 that;

- a) For the whole sample, the numbers of curious and social students are fairly higher than the achiever and the conscientious students.
- b) The number of students in all groups of motivational styles in level 1 is very near to each other. Only the number of social students is slightly lower than others. This result may indicate that all students having different motivational styles attract biology. Similar pattern also appeared in level 2. However, social students in level 3 and especially the curious as well as social students in level 4 are slightly higher than other students in different categories of motivational styles.

- c) Nearly 9% (N=14) of all students can not be assigned one of the motivational styles. These students showed a combination of all motivational styles (ie. 1:1:1:1) or showed a combination of two motivational styles (ie. 2:2). This was considered as normal, because people are thought to have a mixture of these characteristics except that they would display a bias towards one in particular. This is clearly seen in Table 2 in which students' rating on the questionnaire about the statements are given.

Table 2. Student rating on the questionnaire and their classification

Achiever (N=35)			
Level 1 (N=18)	1	5	12
Level 2 (N=5)		1	4
Level 3 (N=6)		3	3
Level 4 (N=6)		3	3
Conscientious (N=31)			
Level 1 (N=17)	1	6	10
Level 2 (N=8)	2	2	4
Level 3 (N=4)		2	2
Level 4 (N=2)		1	1
Curious (N=44)			
Level 1 (N=17)	2	4	11
Level 2 (N=6)		3	3
Level 3 (N=7)	1	2	4
Level 4 (N=14)	2	6	6
Social (N= 40)			
Level 1 (N=14)	2	3	9
Level 2 (N=6)		2	4
Level 3 (N=10)	1	4	5
Level 4 (N=10)	2	3	5

As is shown in Table 2 that there are only 14 students in the sample choose four statements which all belong to the same style. The rest can be assigned mixed motivational traits. In other words, the majority of the students may well exhibit the traits of more than one and can behave predominantly in one category with brief excursions into others. This can be thought an advantage in terms of adapting to the various courses in which different styles might be needed.

One of the purposes of this study was to find out the gender difference regarding motivational styles. Table 3 shows the number and the percentage of students on

motivational styles for the whole sample. In addition these distribution is given for each level in Table 4

Table 3. The distribution of boys and girls on motivational styles for the whole sample.

<i>Motivational style</i>	Boys		Girls	
	N	%	N	%
<i>Achiever</i>	24	43	11	12
<i>Conscientious</i>	7	12	24	25
<i>Curious</i>	11	20	33	35
<i>Social</i>	14	25	26	28
Total	56		94	

Table 4. The number and distribution of boys and girls on motivational styles for each level

<i>Motivational style/ Gender</i>	Level 1		Level 2		Level 3		Level 4	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
<i>Achiever</i> (N=35)	12	6	3	2	4	2	5	1
<i>Conscientious</i> (N=31)	4	13	1	7	1	3	1	1
<i>Curious</i> (N=44)	4	13	2	4	2	5	3	11
<i>Social</i> (N=40)	4	10	2	4	3	7	5	5
Total	24	42	8	17	10	17	14	18

On the basis of the results given in Table 3 it can be said that: i) for the whole sample, more boys than girls appeared as achiever. Nearly half of the boys sample appeared as achievers. On the other hand only %12 of the girls sample is the achiever. ii) The percentage of the boys and girls appeared as almost equal in terms of social characteristics. However, there are significant differences in favour of girls regarding curious and conscientious motivational styles.

When it is looked at to the distribution of boys and girls on motivational styles for each level (Table 4) it can also be seen that i) for level 1, half of the boys are

achiever-oriented and more girls can be categorised in conscientious and curious category and, ii) for level 2, boys are almost equally distributed in all groups but girls who conscientious appear more than others, iii) for level 3, boys are again almost equally distributed in all categories except in conscientious nevertheless, the number of girls is higher in curious and social category than others and iv) for level 4, the number of boys in achiever and social category are higher more than others. In this level the number of girls who are curious are significantly higher than other groups.

Although the sample of this study are the university students, these results of the gender effect on motivational styles showed an overlap with the results of the study done by other researchers in secondary schools (eg. Kempa and Diaz, 1990a; Trumper, 1993). In these studies the boys were also appeared as achievement-oriented and girls were seen as more conscientious style than their counterparts. But there was no indication of curiosity in favour of girls.

The effect of match or mismatch between motivational styles and the kind of the instructional method applied during teaching and learning was not among the purposes of this study. However, as was seen in Table 1, the attractiveness of biology by the students having different motivational styles or the higher number of some particular students who are social or curious in some levels might be seen an important factor on the performance of the students in different instructional environment. Because each motivational style have different characteristics. According to Adar (1969) the characteristics of each group of students are as follows:

- a) The *achiever* student has a distinct preference for an expository method of teaching and learning; enjoy the challenge of competing with others for top marks; hates being held back by a teacher dealing with slow students; seems apathetic towards any special interaction and group activity in learning.
- b) The *conscientious* student displays a preference for an expository method of teaching and learning; wants to know in advance the aims and the goals of the work; wants precise instructions which will allow him to avoid mistakes; will not engage in any extra circular activities during exam times.
- c) The social student is involved in sociable activities; likes to work in groups; enjoys debate and airs opinions; is often too involved with a multitude of

activities to be committed to consisted studying; leaves exam work to last minute.

- d) The curious student has a strong preference for discovery and problem solving activities; prefers open-ended learning tasks; likes to follow his own practical ideas rather than stick with rigid instructions.

Realising the importance the individual differences between students in terms of these cognitive characteristics put on emphasis the questions such as “how does the match and mismatch between students’ and teachers’ cognitive characteristics affect the performance?” and “for a meaningful learning does the instructional procedures should be matched the students’ cognitive characteristics?” Kempa and Diaz (1990a, 1990b) revealed in their studies that students with different motivational traits differ in their preferences for, or dislike of, particular instructional procedures. Their results can be summarised as follows: i) formal teaching methods seems to appeal only to conscientious students, ii) curious students like strongly the independent learning techniques (learning from reference texts etc.) however, conscientious students do reject these techniques, iii) “doing practical work” is an activity that appeals to the curious students but not when it is highly prescribed. Conscientious students, in contrast, express a clear preference for rigorous instructions, iv) group learning activities attract the sociable students, but individualised does not appeal to them and, v) conscientious students, unlike students in other categories, show a distinct preference for having their performance and progress monitored by their teachers, which supports the idea that they are strongly teacher dependent.

In field of computer assisted learning, in an interesting study, Lyall and Johnstone (1999) attempted to design and use a computer assisted learning program that responds to learners of two motivational styles. They used the same test that was used in this study to determine students’ motivational styles. The results of their experiments showed that students, who were conscientious or mildly conscientious adopted a low-risk working style, choosing to assimilate the material according to the recommendations and shape of the program. On the other hand, students who rated curious or mildly curious displayed a more exploratory or high risking working style. Their routes were generally non- linear giving rise to jagged linetrack diagrams. They repeated activities more than the conscientious, were more inactive. Their results clearly indicate that even in computer assisted learning in which there

are more freedom for individualised learning, the dimension of personal characteristics: motivation can play an important role and can effect their way of working.

It is not very surprising that in almost all of the courses given in the secondary or tertiary level there is plenty to motivate the students who are achiever and conscientious. Provided the achievers get to the top in whatever course is available, they will gain satisfaction but even more satisfaction would come from a more challenging course. The shape of the most courses seems to be tailor made for the conscientious. Objectives, work-sheets and objective tests such as multiple choice abound. The mechanical, tick-in-the-box reward gives them a sense of security and achievement. Assessment of practical work, reduced to a series of well-defined behaviours, is just they want. May it be the student who are categorised as “difficult, stupid or awkward” in the class are the one who curious or social frustrated from these challenging strictly planned and organised courses. This brings a question to our mind: are not we neglecting curious and social most of the time by presenting the competitive learning environments or the learning conditions with explicitly defined goals and structure?

It is clear from the information given above that each group of students having different motivational style may prefer different teaching and learning strategies. There is not one, single approach that will motivate all students; what switches some students on to biology or science will be same thing that switches another off. According to Solomon (1996) the more that the motivation can be intrinsic, rather than extrinsic, and student find satisfaction in doing science for own sake, the more likely they are to follow it through into a satisfying career. The question remains as to what type of student is best suited to a career in science. Perhaps the type of biologist or scientist that is produced in universities, through their motivational need and preferred teaching style, determined by the way we teach science at school. Most likely the students who succeed in the school system are the achiever and the conscientious student. Many of the curious and social students, who have attributes highly desirable for future scientists and science teachers, can easily get lost through our emphasis on formal cognitive learning and assessment.

4. CONCLUSION AND TEACHING IMPLICATIONS

The results of this study and other research studies reported in the literature indicate that all of the students can not fit exactly into one category of motivational style and may well exhibit the style of more than one. But, in the majority of cases, students behave predominantly in one category with brief excursions into others. As the results show, the gender difference can have effect on motivational styles: boys are more achiever-oriented, girls appear more conscientious and more curious than boys. In addition, in terms of the preference of instructional style there are obvious differences between students who have various motivational styles.

This study and other studies in this field clearly suggest that there is a need to focus more on motivational factors in biology and science education in general. As Ausubel (1978) stated that motivational characteristics are sufficiently important in school learning that they should engage our most serious consideration if we wish to maximise classroom learning. However, it will not be easy to develop instructional strategies and processes that allow for differences among learners and optimise their learning. May be multiple teaching procedures in actual teaching situations can be a solution for this problem. Because, if a wide range of teaching and learning strategies are used each student will find some opportunities and strategies to which they respond particularly well. The challenge for the teacher and the curriculum designer is to find ways of channelling the motivational styles into means of leading students into the deep, satisfying experiences of meaningful learning. Motivation is in our hands and teachers should recognise the students' motivational styles and plan their activities accordingly. However, due to the normal school time table with the constrains of the National Curriculum this will not be easy and further research studies in our country are required to explore this issue.

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